

Claims

- [c1] 1.A stent delivery system comprising:
an inner tube having a proximal end, a distal end and a stent receiving region;
a stent having a proximal end and a distal end, the stent disposed about the stent receiving region of the inner tube; and
a shape memory metal bumper disposed about the inner tube adjacent the proximal or distal end of the stent.
- [c2] 2.The stent delivery system of claim 1 wherein the shape memory bumper is adjacent the proximal end of the stent.
- [c3] 3.The stent delivery system of claim 1 wherein the shape memory metal bumper has a first reduced profile configuration and a second increased profile configuration, the shape memory metal bumper transformable from the first configuration to the second configuration.
- [c4] 4.The stent delivery system of claim 3 wherein the shape memory metal bumper may be transformed from the first configuration to the second configuration by increasing the temperature of the shape memory metal bumper.
- [c5] 5.The stent delivery system of claim 1 wherein the shape memory metal bumper is a tube having a slotted portion and a non-slotted portion.
- [c6] 6.The stent delivery system of claim 5 wherein the shape memory metal bumper has a first reduced profile configuration and a second increased profile configuration, the shape memory metal bumper expandable from the first configuration to the second configuration.
- [c7] 7.The stent delivery system of claim 6 wherein the slotted portion opens on expansion of the shape memory metal bumper.
- [c8] 8.The stent delivery system of claim 6 wherein the slotted portion extends at a non-zero angle relative to the non-slotted portion on expansion of the

shape memory metal bumper.

- [c9] 9.The stent delivery system of claim 1 further comprising a retractable sheath disposed about the stent.
- [c10] 10.The stent delivery system of claim 9 wherein the stent is made of nitinol.
- [c11] 11.The stent delivery system of claim 1 wherein the shape memory metal is nitinol.
- [c12] 12.The stent delivery system of claim 3 wherein the shape memory metal bumper in the increased profile configuration extends radially outward from the inner tube to a greater distance than the stent.
- [c13] 13.A delivery system for delivering an implantable medical device to a bodily lumen comprising:
an inner tube having a proximal end and a distal end;
an implantable medical device having a proximal end and a distal end, the implantable medical device disposed about a portion of the inner tube; and
a shape memory metal bumper disposed about the inner tube adjacent the proximal or distal end of the implantable medical device.
- [c14] 14.The delivery system of claim 13 wherein the shape memory metal bumper is adjacent the proximal end of the implantable medical device.
- [c15] 15.The delivery system of claim 14 wherein the implantable medical device is selected from the group consisting of stents, stent-grafts, grafts and vena cava filters.
- [c16] 16.A device delivery system comprising an inner tube having a proximal end and a distal end;
an implantable medical device having a proximal end and a distal end, the implantable medical device disposed about a portion of the inner tube; and
a shape memory metal bumper disposed about the inner tube adjacent the proximal or distal end of the implantable medical device, the shape memory metal bumper transformable between a martensitic state and an austenitic

state, the shape memory metal bumper having a reduced profile in the martensitic state and an increased profile in the austenitic state.

- [c17] 17.A method of preparing a device for delivery of an implantable medical device comprising the steps of:
- providing a tube having a proximal end and a distal end, the distal end terminating in an enlarged tip, the tube having a bumper proximal to the tip, the bumper formed of a shape memory metal, the bumper expandable from a reduced profile state to an increased profile state, the bumper in the reduced profile state;
 - providing an implantable medical device having a flow passage therethrough, the flow passage sized to allow the bumper in the reduced profile state to pass therethrough;
 - passing the implantable medical device about the bumper and disposing the implantable medical device about the inner tube adjacent to the bumper, between the bumper and the tip;
 - causing the bumper to transition from the reduced profile state to the increased profile state.
- [c18] 18.The method of claim 17 wherein the implantable medical device is a stent.
- [c19] 19.The method of claim 18 further comprising the step of providing a manifold to the proximal end of the inner tube subsequent to the passing step.
- [c20] 20.The method of claim 18 further comprising the step of providing a retractable sheath about the stent.
- [c21] 21.The method of claim 20 further comprising the step of providing a manifold to the proximal end of the inner tube subsequent to the passing step.
- [c22] 22.The method of claim 20 wherein the retractable sheath is provided about the stent subsequent to disposing the stent about the inner tube adjacent to

the bumper, between the bumper and the tip.

[c23] 23.The method of claim 20 wherein the retractable sheath is provided about the
stent prior to disposing the stent about the inner tube adjacent to the
bumper, between the bumper and the tip.

[c24] 24.The method of claim 18 wherein the bumper is a tube having a slotted
portion and a non-slotted portion.

[c25] 25.The method of claim 18 wherein the bumper is made of nitinol.

[c26] 26.The method of claim 18 wherein the temperature of the bumper is
increased during the causing step thereby causing the bumper to transition
from the reduced profile state to the increased profile state.

[c27] 27.The method of claim 18 wherein the shape memory metal bumper has a
martensitic state and an austenitic state, the bumper in the martensitic state
being in the reduced profile state, the bumper in the austenitic state being in
the increased profile state.

[c28] 28.The method of claim 27 wherein the temperature of the shape memory
bumper has an austenitic start temperature and an austenitic finish
temperature and the temperature of the bumper is increased to a
temperature exceeding the austenitic start temperature during the causing
step thereby causing the bumper to transition from the reduced profile state
to the increased profile state.

[c29] 29.The method of claim 28 wherein the shape memory metal bumper is
made of nitinol.

[c30] 30.A medical device delivery system comprising:
a manifold having a rack and pinion, the rack slidable in a proximal
direction;
an inner tube having a proximal end and a distal end, the inner tube
extending distally from the manifold;

a retractable sheath disposed about the distal end of the inner tube; and
a pull-wire extending proximally from the retractable sheath to the
manifold, the pull wire attached to the pinion.

- [c31] 31.The medical device delivery system of claim 30 wherein the rack is movable in a distal direction.
- [c32] 32.The medical device delivery system of claim 30 wherein the retractable sheath is retracted by moving the rack in the proximal direction.
- [c33] 33.The medical device delivery system of claim 30 wherein the retractable sheath is retracted by moving the rack in the distal direction
- [c34] 34.The medical device delivery system of claim 30 wherein the manifold comprises a first part and a second part, the first part movably received in the second part, the pinion disposed in the first part and the rack disposed in the second part.
- [c35] 35.The medical device delivery system of claim 30 further comprising a stent disposed about the inner tube and covered by the retractable sheath.
- [c36] 36.The medical device delivery system of claim 30 wherein the pinion comprises a gear portion and a spool portion for taking up the pull wire.
- [c37] 37.The medical device delivery system of claim 36 wherein the pull wire is wound around the spool portion when the rack is moved in a proximal direction.
- [c38] 38.The medical device delivery system of claim 30 wherein the pinion is movable in a proximal direction.
- [c39] 39.The medical device delivery system of claim 30 wherein the retractable sheath is retracted by moving the pinion in the proximal direction.